Title: Computer graphics
Final exam, Date: 3/6/2012, **Total marks:** 75

Course code: CCE2211   **Year:** Second year
Allowed time: 3 hours   **Number of pages:** 2

Workout the following questions

Question 1 (15 marks)

a) Mention some application areas of computer graphics. (5 marks)

b) Explain why images are better displayed than text on CRT monitors while text is better displayed than images on LCD monitors. (5 marks)

c) Movies are generally produced on 35-mm film that has a resolution of approximately 2000 x 3000 pixels. What implication does this resolution have for producing animated images for a video show on a computer as compared with film? (5 marks)

Question 2 (15 marks)

a) Explain with examples when possible: "OpenGL graphics library functions can be generally classified into primitive functions, attribute functions, viewing functions, transformation functions, input functions, control functions and query functions." (5 marks)

b) Write an OpenGL program to draw the symbolic characters shown below. (10 marks)

Question 3 (15 marks)

a) The following figure shows a scene that appears deformed when displayed on the output screen of an OpenGL program
   i.   Discuss possible reasons that could lead to the shown deformation
   ii. How you can avoid such deformations?
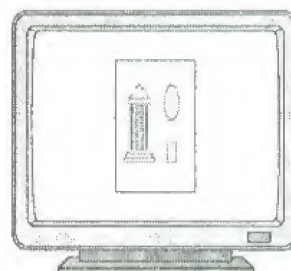
b) What is the purpose of each of the following OpenGL function calls? Explain how the parameters are used, if any. (10 marks)
    i.   glClear(GL_COLOR_BUFFER_BIT);
    ii.   glutInitDisplayMode(GLUT_SINGLE | GLUT_RGB | GLUT_DEPTH);
    iii. glEnable(GL_DEPTH_TEST);
    iv. glOrtho(-50. 0,50.0 ,-50.0, 50.0, -50.0, 50.0);

Question 4 (15 marks)

a) What is the difference between interactive and non-interactive computer graphics program? What are the components/libraries required to implement an OpenGL interactive computer program? (5 marks)

b) Write an OpenGL program that draw a face. Model the face simply by one circle for the outline, two circles for the two eyes, one circle for the nose, and one half-circle for the mouse (see the figure below). Your program should use hierarchical modeling implemented by display lists to draw the face.. (10 marks)

Question 5 (15 marks)

a) Mention some possible reasons that could lead to flickering or to the appearance of artifacts when executing an OpenGL program (5 marks)

b) If you know the following:

The two-dimensional point (in a Cartesian coordinates): $x = cos(\theta)$, $y = sin(\theta)$ lies on a unit circle regardless of the value of θ. Also, the three points $(-sin(\theta), cos(\theta))$, $(-cos(\theta), -sin(\theta))$, and $(sin(\theta), -cos(\theta))$ lie on the unit circle. These four points are equidistant along the circumference of the circle. By connecting the four points we get a square that has a side length of $\sqrt{2}$. This is true for any value of θ.

Write an OpenGL program that draw a rotating square using the above information

Good Luck

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And the examination committee